

REMARKS

This paper is filed in response to the official action dated August 25, 2004 (hereafter, the "official action"). This paper is timely-filed as it is accompanied by a petition for an extension of time to file in the first month and a check covering the requisite one-month extension fee of \$120.

Prior to entry of the foregoing amendments, claims 1-6 were pending. By the foregoing amendments, claims 1-3 and 6 have been amended. Support for the amendments to the claims may be found, for example, at page 5, line 2 - line 14, and in the claims as originally filed. No new matter has been added.

Claims 1-6 have been rejected under 35 U.S.C. § 112 as being indefinite. Claims 1-3 have been rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,851,358 to Huber ("Huber). Claims 4-6 have been rejected under 35 U.S.C. §103(a) as being obvious over Applicant's admitted prior art and Huber.

Additionally, the Examiner objected to the instant specification because of various typographical errors. These typographical errors have been corrected by the amendments set forth herein, and the Examiner's objection to the specification should therefore be withdrawn.

The various bases for the claim rejections are addressed below in the order presented in the official action. Reconsideration of the application, in view of the foregoing amendments and the following remarks, is solicited.

I. 35 U.S.C. §112 Rejections

Claims 1-6 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite. *See* official action at page 2. More specifically, the Examiner indicated that "the phrase 'etc.' renders the claim(s) [sic] indefinite because it is unclear whether the limitations preceding the phrase are part of the claimed invention."

Claim 1 has been amended to correct the asserted indefiniteness problem. It is respectfully submitted that the asserted indefiniteness problem did not render claims 1-6 indefinite under §112, because a claim is considered definite as long as "the scope of the claims is clear so the public is informed of the boundaries of what constitutes infringement of the patent." *See* M.P.E.P. § 2173. Nevertheless, in view of the

amendment to claim 1 presented herein, the rejections of claims 1-6 for indefiniteness should be withdrawn.

II. 35 U.S.C. §102 Rejections

Claims 1-3 have been rejected under 35 U.S.C. §102(b) as being anticipated by Huber. *See* official action at page 3. The Applicants respectfully traverse the rejections of claims 1-3 as being anticipated by Huber.

It is well-established that each and every limitation of a claimed invention must be present in a single prior art reference in order for anticipation to occur. *See*, for example, *C.R. Bard, Inc. v. M3 Systems, Inc.*, 157 F.3d 1340, 1349 (Fed. Cir. 1998). The standard for anticipation is one of strict identity. This standard has not been satisfied with respect to the pending claims, as amended herein.

Claims 1-3 recite annealing a wafer at a low temperature under nitrogen (N₂) atmosphere to form a nucleation site deep into the wafer, and subsequently performing a rapid thermal annealing process under nitrogen (N₂) atmosphere so that oxygen precipitation material is trapped in the nucleation site. The Examiner asserted that “Huber (col. 4, line 54 to col. 7, line 7) discloses the claimed invention by annealing a wafer in a nitrogen atmosphere to form nucleation sites, and performing a rapid thermal annealing process under a nitrogen atmosphere to form gettering sites.” *See* official action at page 3.

However, in contrast to the Examiner’s characterization, the rapid heating step disclosed by Huber is performed so that the concentration of *gettering sites is decreased*. *See* Huber at column 2, lines 53-57. In contrast, claims 1-3 recite performing a rapid thermal annealing process so that oxygen precipitation material or metallic impurity is *trapped* in the nucleation site(s) formed by annealing a wafer at a low temperature.

Additionally, Huber does not specify that the annealing at a low temperature is performed under nitrogen atmosphere, as recited by all claims 1-6. Rather, Huber teaches that “[s]uch low temperature will typically be carried out in a conventional batch furnace under *an inert or non-inert* atmosphere.” *See* Huber at column 6, lines 26-29.

Furthermore, Huber does not specify the sequence of annealing steps, as recited by all claims 1-6 (i.e., annealing a wafer at a low temperature, and

subsequently performing a rapid thermal annealing process on the wafer at a high temperature). Instead, according to “the exemplary embodiment,” a rapid heating step is performed at high temperature (900~1300°C) to reduce the concentration of small oxygen clusters capable of growing into gettering sites, and an annealing step is subsequently performed at low temperature (550~850°C) to increase the concentration of such small oxygen clusters. *See* Huber at column 2, lines 44-67. Huber also teaches that “[p]referably, however, the concentration enhancement phase will be accomplished first.” *See* Huber at column 6, lines 52-55.

For the reasons set forth above, it is respectfully submitted that the outstanding anticipation rejections of claims 1-3 should be withdrawn.

II. 35 U.S.C. §103(a) Rejections

Claims 4-6 have been rejected under 35 U.S.C. §103(a) as being obvious over Huber in view of Applicants’ alleged admissions at pages 1-2 of the specification and Fig. 1. The Applicants respectfully traverse the rejections of claims 4-6 as being obvious over Huber in view of Applicants’ alleged admissions regarding Fig. 1.

A *prima facie* case of obviousness *requires* three basic criteria. *First*, there must be some suggestion or motivation, either in the references themselves, or in knowledge generally available to one of ordinary skill in the art, to modify a reference or to combine reference teachings. *Second*, there must be a reasonable expectation of success in doing so. *Third*, prior art references, when combined, must teach or suggest all of the claim limitations. *See* M.P.E.P. §2142.

At least the first and third criteria are not satisfied with respect to claims 4-6, as explained in more detail below. In view of these deficiencies, the Applicant respectfully submits that the obviousness rejections should be withdrawn.

The Applicants submit that claims 4-6 are not obvious over Huber for the reasons discussed above with respect to the 35 U.S.C. §102(b) rejections. Therefore, reconsideration of pending claims 1-6, as amended herein, is respectfully requested.

The Applicants further submit that claims 5 and 6 are not obvious over Huber because Huber does not disclose a three-step annealing process and does not specify the sequence of the of annealing steps, as recited by all claims 1-6 (i.e., annealing a wafer at a low temperature and subsequently performing a rapid thermal annealing process on the wafer at a high temperature). Thus, the Examiner turned to

Applicants' alleged admissions regarding Fig. 1. However, the Examiner has not provided any reason or motivation for combining Huber with Figure 1, which the Applicants submit is merely illustrative of the state of the art when the application was filed.

Moreover, neither Huber, Fig. 1, nor the combination thereof disclose or suggest first performing a high-temperature annealing process on the wafer in order to diffuse oxygen existing on the surface of the wafer toward the outside, subsequently annealing the wafer at a low temperature under nitrogen (N₂) atmosphere to form a nucleation site deep into the wafer, and then performing a rapid thermal annealing process under nitrogen (N₂) atmosphere so that oxygen precipitation material is trapped in the nucleation site, as recited by claims 5 and 6. Such methods decrease the time needed for manufacturing and increase wafer quality.

The Applicants therefore submit that claims 5-6 are not obvious over Huber for these additional reasons. Therefore, reconsideration of pending claims 1-6, as amended herein, is respectfully requested.

CONCLUSION

It is respectfully submitted that this application is now in condition for allowance. Should the Examiner wish to discuss the foregoing, or any matter of form or procedure in an effort to advance this application to allowance, she is respectfully invited to contact the undersigned attorney at the indicated telephone number.

Respectfully submitted,

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December 27, 2004